

## CLAIMS

What is claimed is:

- 1 1. A method for management of network addresses comprising the steps of:  
2 determining an address utilization state of a network; and  
3 performing a specified action in response to the address utilization state.
- 1 2. The method of claim 1 further comprising the steps of:  
2 comparing the address utilization state with condition information;  
3 upon the address utilization state meeting the condition, completing the step of  
4 performing a specified action wherein the specified action is associated with  
5 the condition; and  
6 upon the address utilization state not meeting the condition, completing the step of  
7 performing a specified action wherein the specified action is a null action.
- 1 3. The method of claim 1 wherein the action is allocating specific addresses to a  
2 particular network, the addresses being assignable to devices on the particular  
3 network.
- 1 4. The method of claim 1 wherein the action is reconfiguring addresses on a particular  
2 network including more than one address block, resulting in decreasing the number of  
3 address blocks associated with the particular network.
- 1 5. The method of claim 4 wherein the addresses are reconfigured based on an existing  
2 address block.
- 1 6. The method of claim 1 wherein the action is reclaiming specific addresses from a  
2 particular network, resulting in making the addresses unassignable to devices on the  
3 particular network.

- 1 7. The method of claim 1 wherein the action is notifying a network access manager that  
2 an address utilization condition is met and awaiting a response from the network  
3 access manager as to further action to perform.
- 1 8. The method of claim 1 wherein the step of determining the state of address utilization  
2 comprises querying a Dynamic Host Configuration Protocol (DHCP) server.
- 1 9. A method for automated management of network addresses comprising the steps of:  
2 receiving condition information describing a network address utilization state for  
3 triggering an action;  
4 receiving action information describing an action associated with the condition;  
5 determining an address utilization state of a network; and  
6 performing the specified action in response to the address utilization state meeting the  
7 condition.
- 1 10. The method of claim 9 wherein the description of the condition and the specification  
2 of the action are received from a broadband network access provider.
- 1 11. The method of claim 9 wherein the step of determining the address utilization state  
2 comprises querying a Dynamic Host Configuration Protocol (DHCP) server.
- 1 12. The method of claim 9 wherein the step of performing the specified action comprises  
2 the steps of:  
3 defining to an address assignor one or more ranges of network addresses wherein the  
4 ranges include addresses that are assignable to devices on a network; and  
5 configuring at least one routing means on the network to support routing  
6 transmissions to at least one of the network addresses.

1 13. The method of claim 12 wherein the step of configuring at least one routing means  
 2 comprises the steps of:  
 3 creating one or more sub-interfaces on a physical interface of the routing means,  
 4 wherein each sub-interface is associated with a particular network service  
 5 provider; and  
 6 assigning one or more sub-networks to one or more of the sub-interfaces.

1 14. The method of claim 12 wherein the step of performing the specified action further  
 2 comprises the steps of:  
 3 specifying to the address assignor one or more sub-networks to which any of the one  
 4 or more defined network address ranges are assignable;  
 5 reserving a network address for a particular router means associated with a particular  
 6 sub-network from the one or more sub-networks, wherein the reserved  
 7 network address is from a defined address range assigned to the particular  
 8 sub-network; and  
 9 specifying to the address assignor a particular default routing means for a particular  
 10 device on the network that is assigned a network address from any of the one  
 11 or more defined address ranges.

1 15. The method of claim 12 wherein the step of defining to an address assignor one or  
 2 more ranges of network addresses comprises proportionally associating a range of  
 3 network addresses to routing means based on a previous distribution of addresses  
 4 associated with the routing means.

1 16. The method of claim 9 wherein the step of performing the specified action comprises  
 2 the steps of:

3 defining to an address assignor one or more ranges of network addresses wherein the  
4 ranges include addresses that are assignable by the address assignor to devices  
5 on a network and wherein the ranges of network addresses are newly defined  
6 to the address assignor;  
7 configuring at least one routing means on the network to support routing  
8 transmissions to at least one of the network addresses;  
9 specifying to the address assignor one or more sub-networks to which any of the one  
10 or more defined address ranges are assignable;  
11 reserving a network address for a particular router means associated with a particular  
12 sub-network from the one or more sub-networks, wherein the reserved  
13 network address is from a defined address range assigned to the particular  
14 sub-network;  
15 specifying to the address assignor a particular default routing means for a particular  
16 device on the network that is assigned a network address from any of the one  
17 or more defined address ranges; and  
18 directing the address assignor to discontinue renewing and distributing network  
19 addresses from one or more old ranges of network addresses other than those  
20 newly defined to the address assignor.

- 1 17. The method of claim 16, further comprising, upon passing of one address lease cycle  
2 associated with the address assignor and each network device administered by the  
3 address assignor, the steps of:  
4 removing from the address assignor the capability to assign to network  
5 devices the addresses from the one or more old ranges, and  
6 removing from routing means the capability to support routing transmissions  
7 to the network addresses from the one or more old ranges.

1 18. The method of claim 16 wherein the step of configuring routing means comprises the  
2 steps of:

3 creating one or more sub-interfaces on a physical interface of the routing  
4 means, wherein each sub-interface is associated with a particular  
5 network service provider; and  
6 assigning one or more sub-networks to one or more of the sub-interfaces.

1 19. The method of claim 9 wherein the step of performing the specified action comprises  
2 the steps of:

3 directing an address assignor to discontinue renewing and distributing network  
4 addresses from one or more ranges of network addresses; and  
5 upon passing of one address lease cycle associated with the address assignor and each  
6 network device administered by the address assignor, removing from the  
7 address assignor the capability to assign to network devices the addresses  
8 from the one or more ranges, and removing from one or more routing means  
9 the capability to support routing transmissions to the network addresses from  
10 the one or more ranges.

1 20. A method for automated management of network addresses comprising the steps of:  
2 receiving condition information describing a network address utilization state for  
3 triggering an action;  
4 receiving action information describing an action associated with the condition;  
5 determining an address utilization state of a network; and  
6 performing the specified action in response to the address utilization state meeting the  
7 condition;

8 wherein the steps are performed at one or more facilities from a hierarchical group of  
9 facilities described, in increasing levels, as a cable head-end facility, a cable  
10 regional data center facility, and a cable national data center facility; and  
11 wherein the steps are performed at one of the one or more facilities to manage  
12 network addresses of facilities on the same hierarchical level.

1 21. The method of claim 20 wherein the steps are performed at one of the one or more  
2 facilities to manage network addresses of facilities on a lower hierarchical level.

1 22. A method for automated management of network addresses comprising the steps of:  
2 receiving condition information describing a network address utilization state for  
3 triggering an action;  
4 receiving action information describing an action associated with the condition;  
5 determining an address utilization state of a network wherein the available network  
6 addresses are substantially utilized and responsively performing the steps of:  
7 defining to an address assignor one or more ranges of network addresses wherein the  
8 ranges include addresses that are assignable to devices on the network;  
9 configuring at least one routing means on the network to support routing  
10 transmissions to at least one of the network addresses;  
11 specifying to the address assignor one or more sub-networks to which any of the one  
12 or more defined network address ranges are assignable;  
13 reserving a network address for a particular router means associated with a particular  
14 sub-network from the one or more sub-networks, wherein the reserved  
15 network address is from a defined address range assigned to the particular  
16 sub-network; and

17 specifying to the address assignor a particular default routing means for a particular  
18 device on the network that is assigned a network address from any of the one  
19 or more defined address ranges.

1 23. A computer-readable medium carrying one or more sequences of instructions for  
2 managing network addresses, wherein execution of the one or more sequences of  
3 instructions by one or more processors causes the one or more processors to perform  
4 steps of:  
5 determining an address utilization state of a network; and  
6 performing a specified action in response to the address utilization state.

1 24. The computer-readable medium of claim 23 wherein execution of the one or more  
2 sequences of instructions by one or more processors causes the one or more  
3 processors to perform the specified action by causing the one or more processors to  
4 perform a step of:  
5 allocating specific addresses to a particular network, the addresses being assignable to  
6 devices on the particular network.

1 25. The computer-readable medium of claim 23 wherein execution of the one or more  
2 sequences of instructions by one or more processors causes the one or more  
3 processors to perform the specified action by causing the one or more processors to  
4 perform a step of:  
5 reconfiguring addresses on a particular network including more than one address  
6 block, resulting in decreasing the number of address blocks associated with  
7 the particular network.

1 26. The computer-readable medium of claim 23 wherein execution of the one or more  
2 sequences of instructions by one or more processors causes the one or more

3 processors to perform the specified action by causing the one or more processors to  
4 perform a step of:  
5 reclaiming specific addresses from a particular network, resulting in making the  
6 addresses unassignable to devices on the particular network.

1 27. The computer-readable medium of claim 23 wherein execution of the one or more  
2 sequences of instructions by one or more processors causes the one or more  
3 processors to perform the specified action by causing the one or more processors to  
4 perform a step of:  
5 notifying a network access manager that an address utilization condition is met and  
6 awaiting a response from the network access manager as to further action to  
7 perform.

1 28. The computer-readable medium of claim 23 wherein execution of the one or more  
2 sequences of instructions by one or more processors causes the one or more  
3 processors to perform the step of determining a state of address utilization by causing  
4 the one or more processors to perform a step of:  
5 querying a Dynamic Host Configuration Protocol (DHCP) server application.

1 29. A computer system comprising:  
2 a network interface; and  
3 one or more processors connected to the network interface, the one or more  
4 processors configured for  
5 receiving a description of a condition describing a network address utilization state for  
6 triggering an action;  
7 determining an address utilization state of a network; and  
8 performing the action in response to the address utilization state meeting the  
9 condition.



1 30. An apparatus for managing network addresses, the apparatus comprising:  
2 means for receiving a description of a condition describing a network address  
3 utilization state for triggering an action;  
4 means for determining an address utilization state of a network; and  
5 means for performing the action in response to the address utilization state meeting  
6 the condition.